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## **SECTION 8.0 - CAD ENGINEERING AND CONSTRUCTION**

## 8.0 CAD ENGINEERING AND CONSTRUCTION

This section describes the basis for conceptual engineering for CAD disposal of New Bedford/Fairhaven Harbor UDM and a description of potential construction sequencing associated with the implementation of the aquatic preferred alternative, as identified in this DEIR. Included in the discussion of the construction measures are the steps necessary to minimize negative environmental impacts associated with the disposal of UDM in the marine environment.

### 8.1 Conceptual Engineering

In order to evaluate the practicability of the preferred alternative, conceptual engineering of potential CAD pit aquatic disposal cells needed to be conducted. Inherent in this exercise is a set of assumptions based upon the level of data collected. The results of this exercise are not intended to provide a specific final design. The results of the conceptual engineering exercise are for illustrative purposes only, final CAD cell designs and specifics will be refined further in the FEIR.

#### 8.1.1 Planning Horizon UDM Volumes

To calculate the disposal capacity based upon engineering principles, conceptual engineering drawings were developed for each of the proposed preferred alternatives. Calculations were conducted to evaluate the ability of the general site area, in its current site configuration, to accommodate the volume of UDM identified in the New Bedford/Fairhaven Harbor DMMP. Table 8-1 indicates the projected volumes for each of the DMMP's five-year planning horizons. Of the over 960,000 cubic yards of UDM identified to be dredged, over 70% of this expected volume is projected to occur within the first five-year planning horizon.

**Table 8-1:** UDM Disposal Volumes by Planning Horizon

<i>Planning Horizon</i>	<b>Years 1-5</b>	<b>Years 6-10</b>	<b>Total</b>
<i>UDM Totals</i>	680,000	280,000	960,000

#### 8.1.2 Cell Capacity Calculation

In order to contrast the planning horizon UDM volumes requiring disposal with the preferred alternative disposal sites identified in Section 4.0, site capacity calculations were conducted to determine the extent of the predicted disposal volumes occupying the preferred alternative disposal sites. The footprints of the preferred alternative disposal sites identified through the site screening process for the Harbor were used to determine the areal extent of the Cell Footprint. Assuming a 3 to 1 side slope within the disposal cell, the area of the Cell Bottom was calculated.

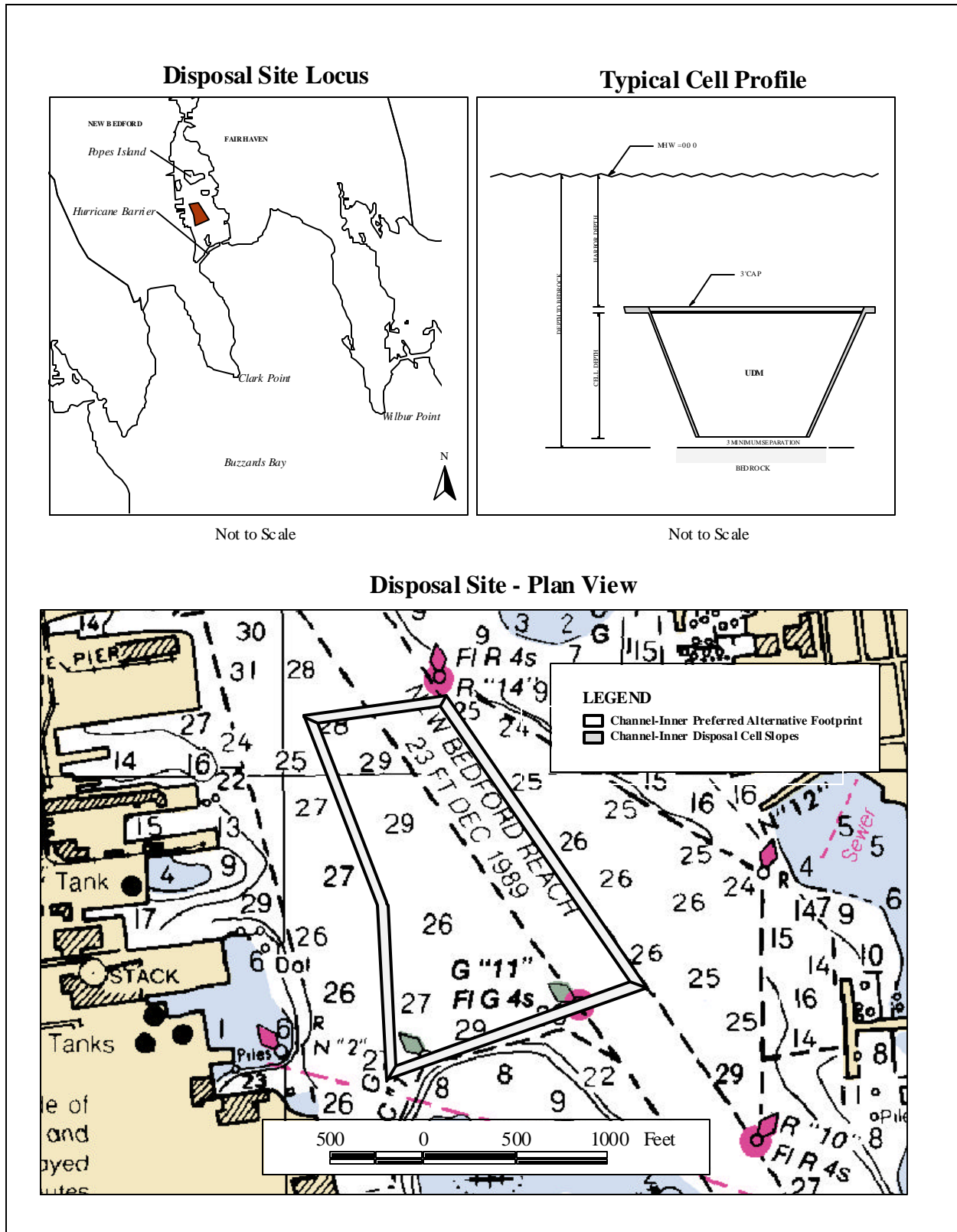
To calculate the total gross capacity for the disposal cells, volumes were determined by using an average end area calculation method. The Cell Footprints and Cell Bottom areas were averaged and then multiplied by the cell depth. Accounting for potential variability in both surface and depth to bedrock contours and limitations of existing data, three feet were subtracted from the average depth to bedrock determined for each site. This assumption resulted in a conservative value for cell depth. For conceptual engineering and planning purposes, the maximum capacity values take into account the variability of seafloor elevations and depth to bedrock to the extent practicable based upon the level of data available for the sites. The maximum cell capacities were then adjusted further to accommodate a three (3) foot thick cap. The cap volume was calculated by multiplying the Cell Footprint Area by three (3) feet. To determine the UDM Capacity for each cell, the cap volume calculated was subtracted from the maximum capacity value for each cell. The gross capacity for Channel Inner was determined to be 1,222,575 cy and Popes Island North was calculated to be 3,266,108 cy.

### ***8.1.3 UDM Volume versus Potential Capacity***

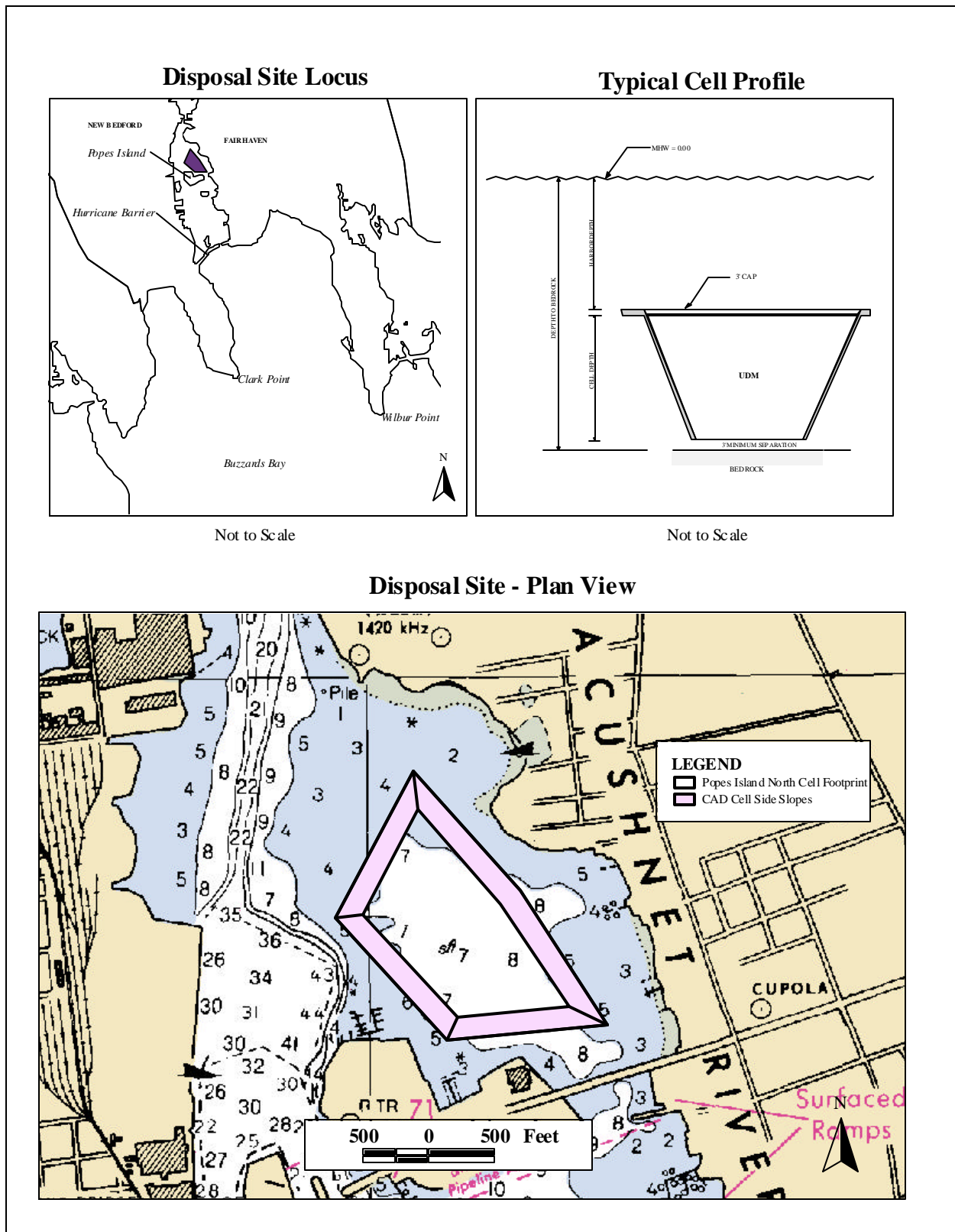
The calculated gross capacities of both the Channel Inner and Popes Island North CAD sites, exceeds the ten-year UDM total of 960,000 cubic yards. The Channel Inner site would be expected to meet the entire demand for dredged material disposal, using 79% of the cell's total capacity. Due primarily to the greater depth to bedrock found in the area north of Popes Island, the Popes Island North CAD site is projected to have a total capacity of over three million cubic yards and would only use 29% of its capacity to accommodate the projected UDM to be dredged in the Harbor.

**Table 8-2:** UDM Volume versus Potential Capacity

	<b>Channel Inner</b>	<b>Popes Island North</b>
<b><i>UDM Capacity (cy)</i></b>	1,222,575	3,266,108
<b><i>Ten-Year UDM Volume</i></b>	960,000	960,000
<b><i>Surplus Capacity</i></b>	262,575	2,306,108
<b><i>Percent Capacity Used</i></b>	78.5%	70.8%



**Figure 8-1:** Conceptual Engineering for Channel Inner CAD Site



**Figure 8-2:** Conceptual Engineering for Popes Island North CAD Cell

#### 8.1.4 Disposal Cell Phasing Scenarios

The final phase of the conceptual engineering exercise is the contrasting of calculated subcell capacities with planning horizon UDM volumes to develop potential disposal phasing scenarios. Two possible scenarios are presented (Figures 8-3 and 8-4). Scenario 1 involves the use of two subcells (Subcells 1 and 2) at the Channel Inner site while Scenario 2 uses portions of both the Channel Inner and Popes Island North site footprints. Under Scenario 2, the northern portion of the Channel Inner site (Subcell 3) is configured to avoid the potential quahog relay area to the south and uses the Popes Island North site (Subcell 4) to meet the baseline dredging demand disposal needs.

To account for possible additional UDM, an assumption was made that the footprints of Channel Inner and Popes Island North subcells would be UDM (three feet thick). This additional UDM, was subtracted from the UDM Capacity subcell volume calculated above to determine an Adjusted UDM Capacity. Table 8-3 shows the results of this adjustment.

**Table 8-3:** UDM Capacity Adjustment for Subcell Scenarios

Scenario	UDM Capacity (cy)	UDM Footprint Adjustment (cy)	Adjusted UDM Capacity (cy)
<i>Scenario 1 - Channel Inner Only</i>			
Subcell 1	832,281	142,677	689,604
Subcell 2	343,651	58,912	284,739
<i>Scenario 2 - Channel Inner and Popes Island North</i>			
Subcell 3	1,153,606	161,942	991,664
Subcell 4	1,342,453	105,555	1,236,898

By contrasting the ability of each disposal subcell to accommodate planning horizon UDM volumes with the adjusted UDM capacities (Table 8-3), three of the subcells considered would be able to accommodate either the 0-5 year volume (680,000 cy) or the 6-10 year volume (280,000 cy). However, Channel Inner's Subcell 2, does not have adequate capacity within the Channel Inner footprint to accommodate the 6-10 year volume. As a result of the above findings the following two potential phasing scenarios were developed to coincide with the baseline dredging demand identified by planning horizon.

##### *Scenario 1*

Subcell 1 - 0-5 Year Horizon

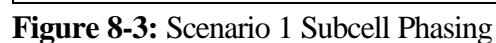
Subcell 2 - 6-10 Year Horizon

##### *Scenario 2*

Subcell 3 - 0-5 Year Horizon

Subcell 4 - 6-10 Year Horizon







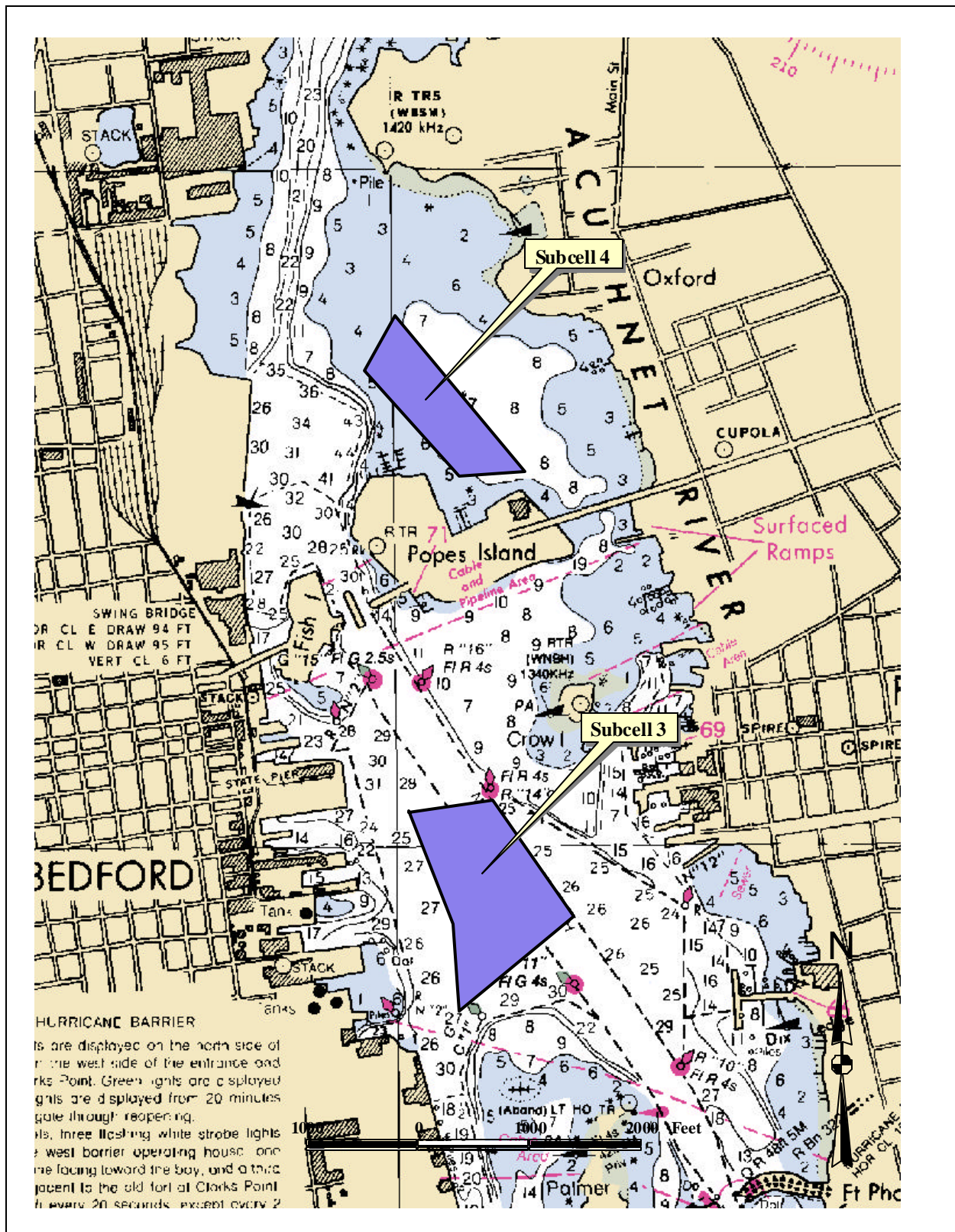


Figure 8-4: Scenario 2 Subcell Phasing



Additional scenarios involving combinations of subcells from both Channel Inner and Popes Island North sites could also be considered if operational or site-specific information dictates using multiple sites. Properties testing conducted on materials from borings taken as part of the marine seismic refraction study indicate that some portions within the cell footprints investigated may be able to support steeper slopes and provide potentially greater capacities (Appendix N). This data will be incorporated into site specific analysis and refined capacities calculated for the FEIR.

Please note that for each five year phase, the DMMP is proposing that each CAD disposal cell be open for UDM disposal for one dredging season within each five year phase. The five year duration of each phase is intended to provide ample notice of availability of a disposal facility, providing facilities an opportunity to secure the necessary permits and funding to conduct dredging projects. This planned opening of a disposal facility on a regular basis should also provide opportunities for coordinating various harbor projects.

In the FEIR, detailed site specific data will be collected for the proposed disposal sites. These data will be examined and revised cell capacities will be calculated based upon site-specific data. The results of the final design of the disposal cells will be determined by coordinating with state, federal and local agencies on cell phasing preferences in developing the both the configuration of the final alternative disposal cell footprints and the phasing sequence proposed in the FEIR.

## **8.2 CAD Cell Construction**

### ***8.2.1 Construction Sequencing***

The general construction phasing proposed in this report is divided into four major steps: cell construction, UDM disposal, cell closure, and management. Prior to the commencement of dredging projects, the construction of the CAD disposal cell needs to be completed first. Dredging of the disposal cells will be completed during an environmentally favorable window to reduce the disturbance to marine life. Cell construction involves the following actions: conducting a pre-dredge survey, project mobilization, dredging the cell footprint, dredging to create cell capacity and final cell contouring. During this step, dredged material suitable for open ocean disposal would be taken to CCDS and UDM (if footprint material determined to be UDM) would be stockpiled for disposal in the cell being constructed.

To construct each cell, dredge limits and locations will be located by Geodetic Positioning System (GPS), which is a satellite positioning system, accurate to within a foot of the intended horizontal design limits. The dredge machinery will most likely be a large barge mounted crane with a clamshell bucket. Bucket size will likely be in excess of ten cubic yards. The material will be removed to the intended depth and side slopes. The Dredging contractor will also be compensated for an allowable over-dredge limit to ensure that the intended depths are achieved. The material is removed by a bucket and deposited within a transport barge called a scow. The scow will deliver the material to the CCDS where it is positioned prior to dumping using GPS. A bottom dumping or split hull scow will most likely be used. These barges open from the bottom allowing the material to drop out through the water column to the seafloor below. This material is clean and will therefore not need to be capped.

Following the completion of the disposal cell, the dredging of UDM from the facilities in the Harbor will be completed by mechanical means, using siltation curtains to minimize turbidity impacts. After being dredged, the UDM will be placed on a dump scow and transported to the disposal cell, where the material will be deposited. If UDM from the footprint had been stockpiled, it would also be placed in the CAD disposal cell.

To close or “cap” the cell, clean material would be placed over the UDM to achieve a thickness of three (3) feet deep to sequester the UDM from the marine environment. By conducting a post capping survey, the need to perform final contouring or placement of additional cap material would be determined. The end result of the capping will be a surface that mimics the ambient seafloor elevations and pre-construction contours.

The final step in the cell construction process is management. To ensure long-term environmental protection, a CAD cell monitoring plan would be implemented. A proposed monitoring plan for consideration is described in Section 9.0. The CAD aquatic disposal cell construction management sequence is illustrated in Figure 8-5.

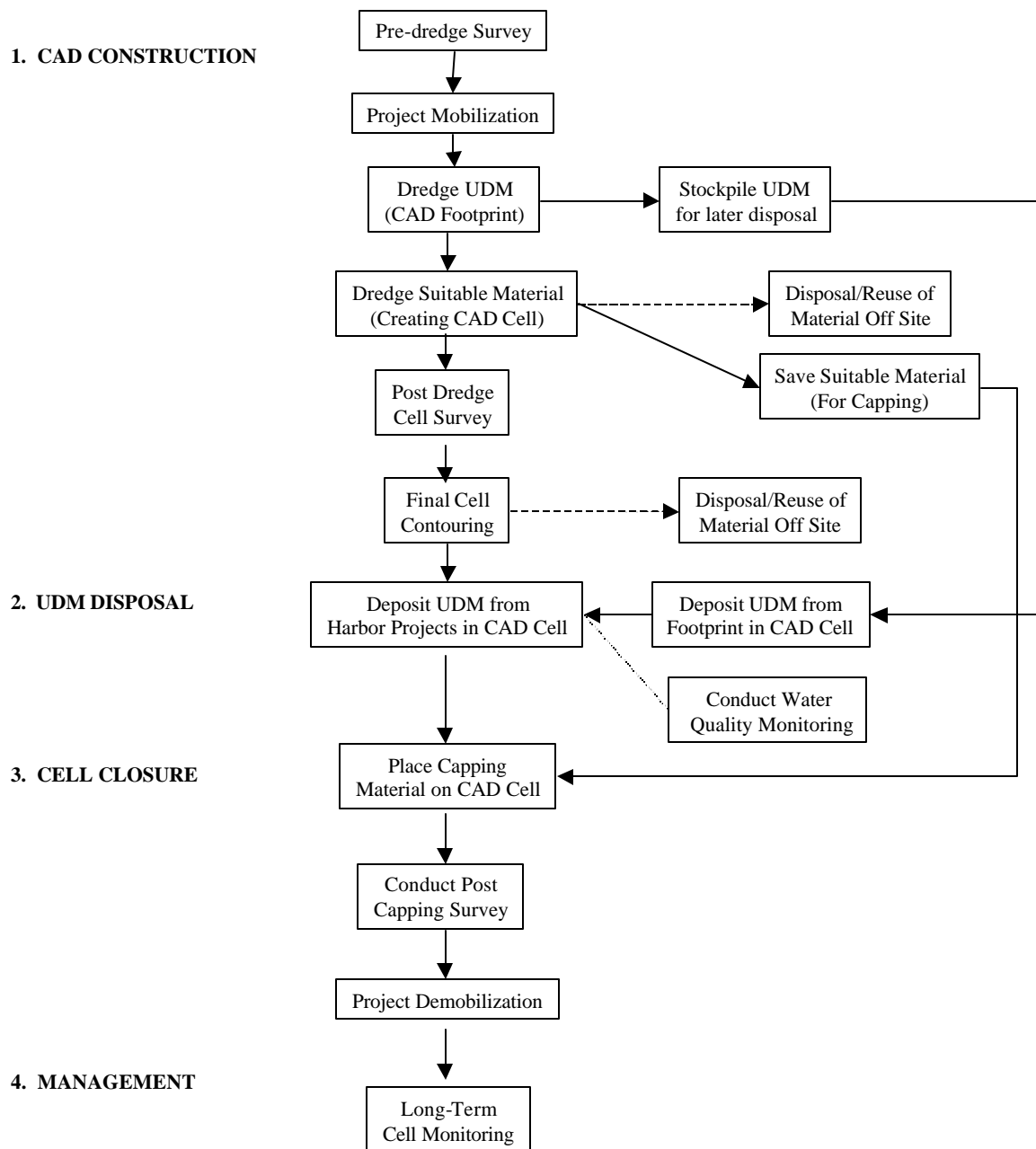
### **8.3 CAD Construction, Design and Operation Under New DEP Regulations**

The DEP is developing new dredging and disposal regulations, which are expected to be finalized in 2002. Any dredging and disposal associated with CAD cells in New Bedford/Fairhaven Harbor will be done under the new regulations. The following two subsections provide specific information related to CAD cells based on the Boston Harbor project. In the absence of existing, formal regulations, the Management Plan and Model Water Quality Certificate are presented here to illustrate the approach to management and operations that will be documented in site-specific detail in the FEIR, under the new regulations. These subsections have been developed to meet the provisions of the draft regulations to the greatest extent practicable, and are not intended to supersede any regulatory provisions, draft or final. The FEIR will contain a management plan and draft Water Quality Certificate based on the final, approved regulations.

#### ***8.3.1 CAD Cell Best Management Practices***

CZM has developed Draft Best Management Practices (BMPs) for CAD of UDM in New Bedford/Fairhaven Harbor based on the experiences and data from the Boston Harbor Navigation Improvement Project (BHNIP). The Draft BMPs are included in Appendix L. The BMPs developed are applicable as 1) stand alone guidelines, 2) the basis for new dredged material disposal regulations, and 3) the basis for site management recommendations in the DMMP FEIR. The BMPs have been developed to meet state and federal water quality criteria and standards under CWA s. 404, 314 CMR 9.00, other applicable regulations. The Draft CAD BMPs have been developed with input and participation of applicable state and federal agencies.

CAD CONSTRUCTION/MANAGEMENT SEQUENCE



**Figure 8-5:** Aquatic Disposal Cell Construction Management Sequence

The proposed BMPs for confined aquatic disposal (CAD) of dredged material include a reference to the development of a Dredging Management Plan (DMP). A DMP is a detailed description of the dredging and disposal activities associated with the operation of a given project, i.e., the volume and quality of the material to be dredged, the equipment planned for use, and the overall schedule of operations.

Following the organization and content of the example will provide project proponents guidance in the development of consistent DMPs. This is important for a CAD cell that may accept dredged material from multiple smaller projects. The DMP should be included in the Environmental or Environmental Impact Statement for a given project, starting with the draft. It should be revised according to comments received during the review process. Following this approach will help assure that regulators have all the information needed to plan, approve, and manage the use of constructed CAD cell(s).

### ***8.3.2 Sample Water Quality Certificate***

CZM has also developed a model Water Quality Certificate (WQC) building upon the experiences of the BHNIP (Appendix M). This model WQC will be applicable to future CAD projects for UDM. The WQC includes provisions for baseline monitoring and monitoring both during and post construction. As with the Draft CAD BMPs, the model WQC has been developed with input and participation of applicable state and federal agencies. The model WQC provides a series of consideration points in developing projects involving dredging and the disposal of dredged material that is unsuitable for unconfined open water disposal at a CAD site. The consideration points presented in the model WQC are based on experience from the BHNIP and review of other related projects.